Python Introduction

Topics to be Covered

An Introduction to Python

- Necessity Of Programming
- What Is Python ?
- Why And Who Created It ?
- **What Python Can Do ?**
- **Why Should I Learn Python In 2018 ?**
- **Important Features**

Why Do We Need Programming ?

- To communicate with digital machines and make them work accordingly
- Today in the programming world , we have more than 800 languages available.
- And every language is designed to fulfill a particular kind of requirement

Brief History Of Programing Language

- C language was primarily designed to develop “System Software” like Operating Systems, Device Drivers etc.
- To remove security problems with “C” language , C++ language was designed.
- It is an Object Oriented Language which provides data security and can be used to solve real world problems.
- Many popular softwares like Adobe Acrobat , Winamp Media Player, Internet Explorer, Mozilla Firefox etc. were designed in C++

Courtesy: http://www.stroustrup.com/applications.html

What is Python ?

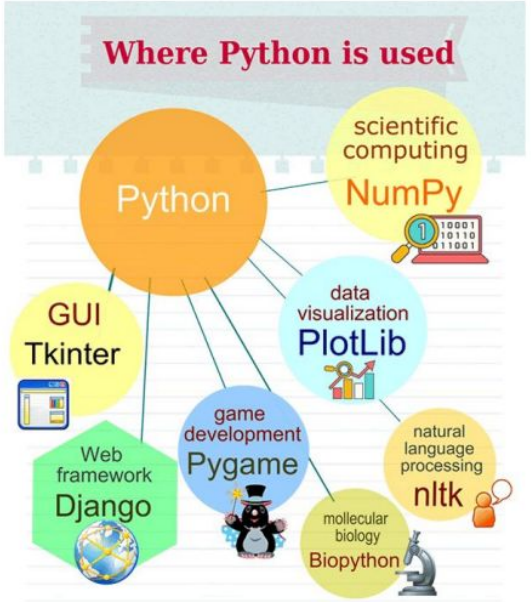
- Python is a **general purpose** and **powerful** programming language.
- It is free and open-source.
- Python is considered as one of the **most versatile programming language** as it can be used to develop almost any kind of application including **desktop application**, **web applications**, **CAD** ,**Image processing** and many more.

Who created Python ?

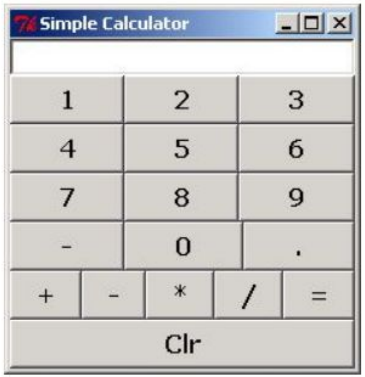
- Developed by **Guido van Rossum** , a Dutch scientist
- Created at **Center For Mathematics and Research** , Netherland
- It is inspired by another programming language called **ABC**

What Python can do ?

- GUI Application
- Web Application
- Data Analysis
- Machine Learning
- Raspberry Pi
- Game Development

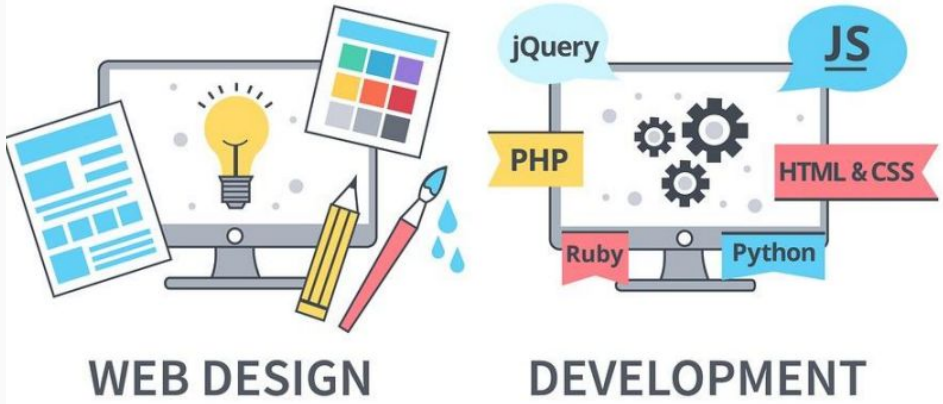


GUI In Python



- Python is used for GUI apps all the time.
- It has famous libraries like PyQT , Tkinter to build desktop apps.

Web Application in Python



- We can use Python to create web applications on many levels of complexity
- There are many excellent Python frameworks like **Django**, **FastAPI** and **Flask** for this purpose

Data Analysis In Python

- **Data Analysis is about making predictions with data**
- Python is the leading language of choice for many data scientists
- It has grown in popularity due to it's excellent libraries like **NumPy** , **Pandas** etc.

Machine Learning In Python

Machine learning is a field of AI (**Artificial Intelligence**) by using which **software applications** can learn to increase their accuracy for the expecting outcomes.

It is heavily used in **Face recognition** , **music recommendation** , **medical data** etc.

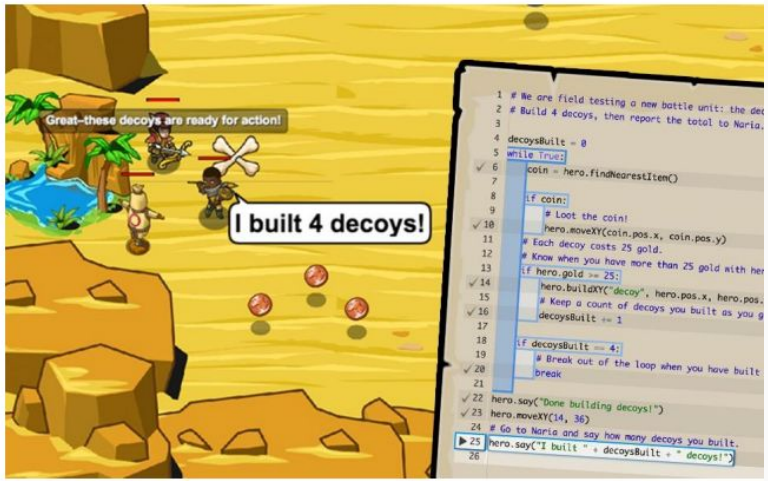
Python has many wonderful libraries to implement ML algos like **SciKit-Learn** , **Tensorflow** etc.

Game Development In Python

We can write whole games in **Python** using **PyGame**.

Popular games developed in Python are:

- **Bridge Commander**
- **Civilization IV**
- **Battlefield 2**
- **Eve Online**
- **Freedom Force**



Why should I learn Python ?

Most popular programming

Opens lots of doors

Big corporates prefer Python

Means , **PYTHON IS THE FUTURE**

TIOBE Index 2022

Programming Language	Ratings	Change
Python	17.18%	+5.41%
C	15.08%	+4.35%
Java	11.98%	+1.26%
C++	10.75%	+2.46%
C#	4.25%	-1.81%
Visual Basic	4.11%	-1.61%
JavaScript	2.74%	+0.08%
Assembly language	2.18%	-0.34%
SQL	1.82%	-0.30%
PHP	1.69%	-0.12%

Who uses Python today ?

Features Of Python

- Simple
- Dynamically Typed
- Robust
- Supports multiple programming paradigms
- Compiled as well as Interpreted
- Cross Platform
- Extensible
- Embedded
- Extensive Library

Simple

- **Python** is very simple
- As compared to other popular languages like **Java** and **C++**, it is easier to code in **Python**.
- **Python** code is comparitively 3 to 5 times smaller than **C/C++/Java** code

Print Hello World!

IN C

```
#include <stdio.h>
int main(){
    printf("Hello World!");
    return 0;
}
```

IN JAVA

```
public class HelloWorld{
      public static void main( String[] args) {
      System.out.println( "Hello World!" );
    }
}
```

IN PYTHON

```
print('Hello World!')
```

Swap 2 Nos

IN C

```
int a=10,b=20,temp;
temp=a;
a=b;
b=temp;
```

IN JAVA

```
int a=10,b=20,temp;
temp=a;
a=b;
b=temp;
```

IN PYTHON

```
a,b=10,20
a,b=b,a
```

Dynamically Typed

Dynamically typed vs Statically typed

Statically Typed (C/C++/Java)	Dynamically Typed – Python
▪ Need to declare variable type before using it	▪ Do not need to declare variable type
▪ Cannot change variable type at runtime	▪ Can change variable type at runtime
▪ Variable can hold only one type of value throughout its lifetime	▪ Variable can hold different types of value through its lifetime

Dynamically Typed

IN C

```
int a;
a=10;
a="World";
```

IN Python

```
a=10
a="World"
```

Robust

Python has very strict rules which every program must

compulsorily follow and if these rules are violated then Python terminates the code by generating “**Exception**”

To understand python’s robustness , guess the output of the

following /C++ code:

```
int arr[5];
int i;
for(i=0;i<=9;i++)
{
arr[i]=i+1;
}
```

Python exceptions

In Python if we write the same code then it will generate **Exception** terminating the code

Due to this other running programs on the computer do not get affected and the system remains safe and secure

Supports Multiple Programming Paradigms

Python supports both **procedure-oriented** and **object-oriented** programming which is one of the key python features.

In ***procedure-oriented*** languages, the program is built around **procedures** or **functions** which are nothing but reusable pieces of programs.

In ***object-oriented*** languages, the program is built around **objects** which combine **data** and **functionality**

Compiled
As Well As Interpreted

Python uses both a compiler as well as interpreter for converting our source and running it

However , the compilation part is hidden from the programmer ,so mostly people say it is an interpreted language

Cross Platform

- Let's assume we've written a Python code for our **Windows machine.**
- Now, if we want to run it on a **Mac**, we don't need to make changes to it for the same.
- In other words, we can take one code and run it on any machine, **there is no need to write different code for different machines.**
- This makes Python a **cross platform language**

Extensible

- Python allows us to call C/C++/Java code from a Python code and thus we say it is an extensible language

- We generally use this feature when we need a critical piece of code to run very fast .

- So we can code that part of our program in C or C++ and then use it from our Python program.

Cython: Cython is a programming language that makes it easy to write C extensions for Python. It allows you to mix Python code with C code, providing a convenient way to optimize performance-critical parts of a Python program.

```
# Example using Cython to interface with C code
# my_module.pyx
def my_function():
    # Some Python code

# setup.py
from setuptools import setup
from Cython.Build import cythonize

setup(
    ext_modules = cythonize("my_module.pyx")
)
```

Embedded

- We just saw that we can put code in other languages in our Python source code.
- However, it is also possible to put our Python code in a source code in a different language like C++.
- This allows us to integrate Python feature into our program of the other language.

Extensive Library

- The Python Standard Library is huge indeed.
- It can help you do various things like Database Programming , E-mailing ,GUI Programming etc

Thank you